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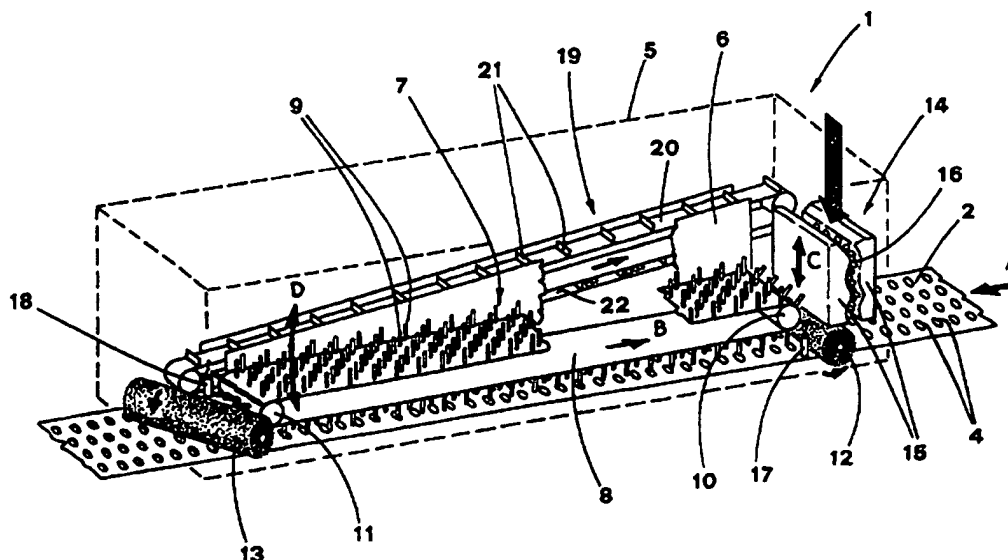
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(21) International Application Number: PCT/IB96/00888 (22) International Filing Date: 2 September 1996 (02.09.96) (30) Priority Data: BO95A000451 27 September 1995 (27.09.95) IT (71) Applicant (for all designated States except US): I.M.A. INDUSTRIA MACCHINE AUTOMATICHE S.P.A. [IT/IT]; Via Emilia, 428-442, I-40064 Ozzano Emilia (IT). (72) Inventor; and (75) Inventor/Applicant (for US only): ORILLO, Antonio [IT/IT]; Via della Bastia, 4, I-40033 Casalecchio di Reno (IT). (74) Agent: DALL'OLIO, Giancarlo; Invention S.n.c., Via del Cestello, 13, I-40124 Bologna (IT).		(81) Designated States: CN, JP, US, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>

(54) Title: **DEVICE FOR FILLING BLISTER BAND WITH ARTICLES**



(57) Abstract

A blister band filling device comprises a member (7) for rabbling articles (3) over a blister band (2), including a support band (8) carrying a plurality of spreading means (9) regularly set and protruding from the external surface thereof. These spreading means (9) move the articles (3) in order to spread them on the blister band and facilitate their collocation in respective receptacles (4) of the band (2). The support band (8) moves in direction opposite to the blister band (2) motion direction. A means (14) for feeding the articles (3) is situated upstream of the rabbling member (7), while a recovery means (19) collects the articles (3) still outside the receptacles downstream of the rabbling member (7), and brings them back to the feeding means.

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DEVICE FOR FILLING BLISTER BAND WITH ARTICLES**TECHNICAL FIELD**

5 The present invention relates to automatic packaging of articles and in particular to filling blister bands with articles like capsules, tablets, pills and similar.

10 **BACKGROUND ART**

 Commonly called blister packs, for packaging of pharmaceutical products, are formed from a flat band of thermoplastic and thermoformable material provided
15 with receptacles for containing articles.

 Generally, the band is covered with a foil of e.g. aluminium and then severed in like portions, which form single blister packs.

 The articles are withdrawn, as known, by
20 breaking the metal foil.

 At present, the receptacles of the band are filled by suitable devices equipped with rabbling elements, e.g. rotating brushes and the like.

 However, the rotating rabbling elements
25 currently used present a disadvantage deriving from the fact that they impart the articles a centrifugal force thus making them strike against each other and against the walls of the filling device. This may cause damages to the articles.

 Another disadvantage of known rabbling elements
30 results from the fact that the rabbling of the articles over the band is irregular, due to

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centrifugal force effect, which creates empty spaces from which the articles are radially moved away to gather near the walls of the filling device.

This causes the risk that some of the
5 receptacles will not be filled, and, consequently, incomplete blister packs will have to be rejected.

DISCLOSURE OF THE INVENTION

10 The object of the present invention is to propose a device that allows filling blister bands with relative articles, without damaging the same articles.

Another object of the invention is to propose a
15 device that makes layers of articles over the entire upper surface of the blister band, with at least one integral layer of products.

The above mentioned objects are achieved by a blister band filling device that comprises a member
20 for rabbling articles over a blister band, the filling device including a support band that carries a plurality of spreading pins regularly set and protruding from the external surface thereof.

These spreading pins move the articles to
25 spread them on the blister band and facilitate their collocation in respective receptacles of the band.

The support band moves in direction opposite to the blister band motion direction. A means for feeding the articles is situated upstream of the
30 rabbling member, while a recovery means collects the articles still outside the receptacles downstream of the rabbling member, and brings them back to the

feeding means.

BRIEF DESCRIPTION OF DRAWINGS

- 5 The characteristics of the invention will be better understood from the following description, with particular reference to the attached drawings, in which:
- 10 - Figure 1 shows a schematic perspective view of the device for filling blister bands, being the subject of the present invention;
- Figure 2 shows a detailed view in transversal section of a means rabbling the articles on the
- 15 blister band;
- Figure 3 shows a longitudinal sectional view of a portion of this rabbling element;
- Figure 4 shows a transversal section, taken along the line IV-IV of the fig. 2, of different
- 20 embodiments of the spreading means carried by the above mentioned rabbling element;
- Figure 5 shows a fragmentary plan view of a different embodiment of the above mentioned rabbling element;
- 25 - Figure 6 shows an orthogonal view of a detail of the rabbling element, taken along the line VI-VI of Fig.5;
- Figure 7 shows a fragmentary plan view of another embodiment of the above mentioned rabbling element.

30

BEST MODES OF CARRYING OUT THE INVENTION

With reference to the above mentioned figures, reference numeral 1 indicates a device for filling a blister band 2 with articles 3 like tablets, capsules, and the like.

5 The band is kept on moving while the receptacles, with their openings turned upwards, are filled by conveying the articles on the band upper surface. The articles are fed to a predetermined zone, whose width is equal to the band width.

10 Then the articles are spread out on a surface downstream of the feeding zone, so that the articles are introduced into those receptacles that have not been filled yet.

15 The blister band 2 moves in direction indicated by arrow A through an external case covering the device, virtually shown with the broken line 5.

20 Two containing longitudinal walls 6 are located inside the case 5 and the blister band runs therebetween. Only one of the containing longitudinal walls is seen in Fig.1.

 The bottom of the case 5 is situated right below the rest and slide surface of the blister band 2.

25 An element 7 for rabbling articles 3 is located between the walls 6 and is arranged longitudinally over the blister band 2. The rabbling element 7 includes substantially a close-loop support band 8 provided with a plurality of spreading means 9 that protrude perpendicularly from the external surface thereof. The spreading means are regularly placed
30 over the band surface.

 The support band 8 is trained around a couple

of pulleys 10,11 and is driven by motor means, which are not shown since they are known, so that the lower run of the support band 8 moves in a direction indicated with the arrow B that is opposite to the
5 direction of the blister band 2, situated below.

The vertical positions of the rollers 10,11 are adjustable, independently one from the other, as indicated with the arrows C and D, so as to allow to adjust the height and possible inclination of the
10 rabbling element 7, and therefore, of the spreading means according to the type of articles to be packed.

In a first embodiment, the spreading means 9 include cylindrical pins, which impart translation movements to the articles 3, so that gradually, they
15 repeatedly move on the whole surface of the blister band, thus filling all the receptacles 4.

Upstream and downstream of the support band 8, there are situated a first brush 12 and a second brush 13, respectively, both having a cylindrical
20 shape and counter-rotating with respect to direction A of the blister band 2.

The brushes 12,13 have bristles relatively soft and are aimed at striking gently the articles 3 to spread them on the blister band 2.

25 The first brush 12 is transversal to the blister band 2.

A means 14 for feeding the articles 3 is situated over the first brush 12 and includes a couple of vertical plates 15 facing each other and
30 transversal with respect to the blister band 2.

The surfaces of the plates 15 face each other and are shaped in such a way as to define a free

space 16 that opens upstream of the first brush 12. The free space has a zigzag section to create deflections in the fall path of the articles 3 toward the blister band 2.

5 In this way, the articles are fed between the plates and fall down toward the band without reaching a speed that could provoke their damage due to the impact with the band upper surface.

The articles feeding is regulated by known
10 detecting means, e.g. not shown sensor, situated just upstream of the first brush 12, that means just downstream of the outlet of the free space 16 between the two plates.

The height of the first brush 12 is adjusted
15 automatically, according to the number of the articles 3 gathered on the blister band 2 and located immediately downstream of the first brush, as will be clear from the following.

This adjustment is controlled by a sensor
20 member 17 situated for this purpose downstream of the brush 12.

The second brush 13 is located downstream of the support band 8 and is inclined with respect to the blister band 2. The second brush is aimed at
25 collecting the exceeding articles, still present on the band, and at moving them toward the side of the device, where a recovery member 19 is placed for picking the articles up.

The recovery member 19 includes another close-
30 loop rotating band 20, that is provided with a plurality of impelling blades 21 regularly spaced apart.

The band 20 extends longitudinally beside the rabbling member 7 over an inclined plane 22. The band is parallel to the inclined plane 22 and drags the articles picked up by the brush 13 toward the mouth
5 of the free space 16 of the feeding means 14.

A sensor 18, situated adjacent to the second brush 13, is aimed at controlling the speed of the band 8 according to the quantity of articles picked up by the brush 13.

10 For the operation of the described device, the blister band 2 is fed with articles 3 via the free space 16 of the feeding means 14.

The deflections in the path through the above mentioned free space 16 causes the articles 3 slowing
15 down, and reduces the speed with which the same articles 3 drop onto the blister band 2.

The layer of the articles 3 distributed on the blister band 2 is levelled by the first brush 12, rotating in direction opposite with respect to the
20 direction A of the blister band 2. The level height depends on the quantity of articles already present immediately downstream of the brush and gathered there due to opposite movement of the support band 8.

Then, the articles 3, conveyed on the blister
25 band 2, come into contact with the pins 9 of the support band 8, and are progressively transported sideways, in such a way as to facilitate their introduction into the receptacles 4, which are still empty.

30 Preferably, the pins 9 are arranged in rows, transversal to the band 8, suitably spaced apart and staggered one with respect to another.

In Fig. 2, there are shown, indicated with broken line 90 for clarity, the pins of one row staggered with respect to the one seen in the foreground.

5 In one particular embodiment, the pins 9 of each row are integral with a respective section bar 23 that can engage a corresponding grooved guide fixed transversally to the band 8, e.g. by screw means 25 (see Fig. 3).

10 Obviously, this allows to substitute the pins 9 in an easy and quick way.

As already said before, the pins 9 have circular section, however, it is possible to use different sections, as shown e.g. in Fig. 4, in which
15 the pins indicated with 9a, 9b and 9c have respectively, square, rhomboidal and wedge sections.

Obviously, the use of particular sections depends basically on different ranges of types of articles to be packed.

20 Figures 5 and 6 show a different embodiment of the rabbling member, in which the spreading means, for sake of clarity still indicated with 9, are formed respectively by a kind of comb 26 carried by the section bar 23 mounted on the groove guide 24.

25 The combs 26 are so mounted on the section bar that they result arranged inclined. As a result, a thrust transversal to the longitudinal axis of the band 8 moves the articles sideways 3.

In particular, combs 26 of adjacent rows
30 defined by groove guides 24, may have different inclinations. As shown in Fig.5.

This difference in inclination causes

alternative motion of the articles 3 from one side of the blister band 2 to the other one, to spread the articles 3 wide over the receptacles 4.

According to another embodiment shown in Fig.7,
5 the groove guides 24 carrying the spreading means 9 are pivotally mounted to the support band 8, for instance in the region of one end of theirs.

This configuration makes it possible to change properly inclination of the groove guides with
10 reference to the longitudinal axis of the band, as shown with dashed lines 24a.

When the articles 3 still present on the blister band 2 outside the receptacles 4 reach the outlet end of the rabbling member 7, they are
15 collected by the second brush 13 and moved to the inlet of the backward moving recovery means 19. Then the recovered articles are dragged by the pushing blades 21, secured to the band 20, along the inclined plane 22 to be eventually dropped into the free
20 space 16 of the article feeding means 14.

The sensor 18 controls the speed of the support band 8 depending on the amount of articles located downstream of the brush 13, so that if too many articles are gathered before the brush 13 the speed
25 of the band 8 will be increased.

The device herein described fills the receptacles of the blister band 2 without causing the articles 3 any damage, since they do not suffer from the effects of centrifugal forces, as it happens with
30 conventional devices.

In the present device, the articles are gently drawn on the surface of the blister band 2 by the

spreading means 9 of the moving support band 8.

A very valuable advantage of the subject device derives from the fact that the articles 3 are spread on the entire surface of the blister band delimited
5 by the case 5, so as to ensure that all the receptacles 4 of the blister band 2 are properly filled.

Moreover, possibility of changing inclination of the support band 8, that carries the spreading
10 means 9, depending on the kind of articles 3 being packed, is very helpful to obtain the best spread of them on the blister band.

The above description is only illustrative and not limitative. Other possible constructive
15 variations are therefore included in the scope of the inventions, as described heretofore and claimed in the following.

CLAIMS

1. Device for filling blister bands with articles, said device including a rabbling member (7), located
5 over a blister band (2), and a means (14) for feeding said articles (3) located upstream of said rabbling member (7), the said device being characterised in that said article rabbling member (7) includes a support band (8) that is arranged over the said
10 blister band (2) being filled and that is fitted with spreading means (9) protruding from the outer surface of said support band for moving said articles (3) over said blister band (2), said support band being driven at a speed that can be adjusted.

15

2. Device as in claim 1, characterised in that said support band (8) is closed in a loop around two rollers (19,11) whose height can be adjusted independently from one each other.

20

3. Device as in claim 1, characterised in that said spreading means (9) includes a plurality of pins protruding from said outer surface of said support band, and perpendicular thereto, said pin being
25 arranged in spaced apart rows transverse to said support band (8) and staggered with respect to each other.

4. Device as in claim 3, characterised in that said
30 pin have circular cross section.

5. Device as in claim 1, characterised in that said

pin have squared cross section.

6. Device as in claim 3, characterised in that said pin have rhomboidal cross section.

5

7. Device as in claim 3, characterised in that said pin have wedge cross section with an apex turned opposite to the motion direction (A) of said blister band (2).

10

8. Device as in claim 1, characterised in that said spreading means (9) are fastened to section bars (23) removably fitted into corresponding transverse groove guides (24) fixed to said support band (8).

15

9. Device as in claim 8, characterised in that said groove guides (24) are pivotally mounted to the support band (8), so that their inclination can be changed with respect to said support band (8).

20

10. Device as in claim 1, characterised in that said spreading means (9) include comb like elements (26) fixed to the band and inclined with reference thereto, so that the articles (3) on the blister band (2) are imparted a transverse thrust, with reference to the advancement motion (A) of said blister band (2).

25

11. Device as in claim 1, characterised in that brush means (12) are located upstream of said rabbling means (7) and rotate opposite to the advancement motion (A) of said blister band (2) to partly stop

30

said articles (3) situated on said blister band (2).

12. Device as in claim 11, characterised in that said brush means (12) are transverse to said blister band
5 (2) and their height can be adjusted depending on the amount of articles (3) gathered on said blister band (2) just upstream of said brush means.

13. Device as in claim 12, characterised in that the
10 height of said brush means (12) is automatically adjusted by sensor means (17) located downstream of said brush means (12).

14. Device as in claim 1, characterised in that an
15 article recovery means (19) is situated downstream of said rabbling means (7) to collect articles (3) not inserted into said receptacles, said article recovery means (19) including:

brush means (13) inclined with respect to said
20 blister band (2) and aimed at moving articles sideways;

a close-loop rotating band (20) fitted with a plurality of equispaced blades (21) and operating on an inclined plane (22) to bring articles (3)
25 collected by said brush means (13) to the inlet of said article feeding means.

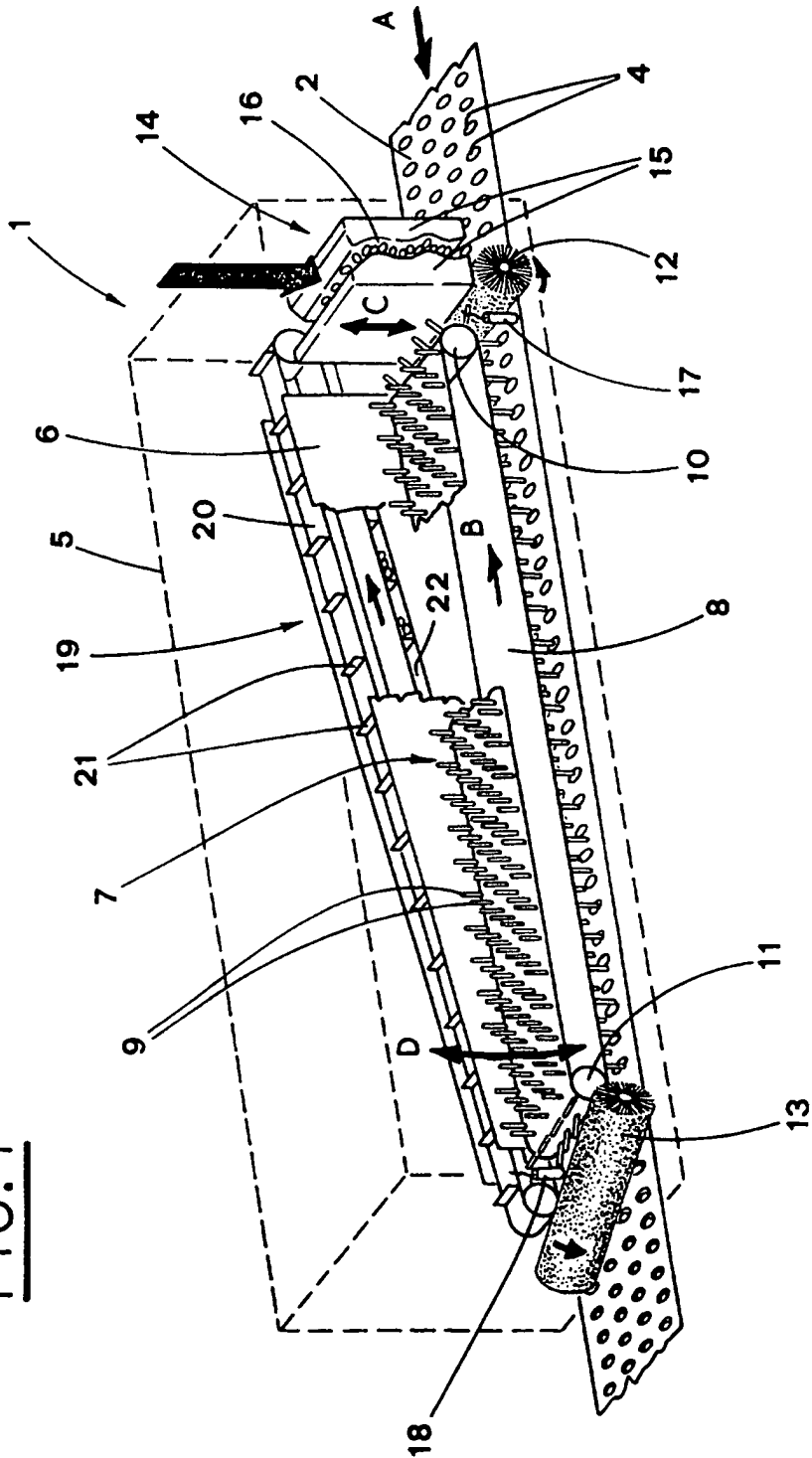
15. Device as in claim 14, characterised in that
rotation speed of said rabbling means (7) is
30 adjustable depending on the amount of articles (3) collected by said inclined brush means (13).

16. Device as in claim 14, characterised in that
sensor means (18) are located just upstream of said
inclined brush means (13) to detect the amount of
articles (3) collected by said inclined brush means
5 (13).

17. Device as in claim 1, characterised in that said
feeding means (14) includes a couple of vertical
plates (15) transversal with respect to said blister
10 band (2), these plates having surfaces that face each
other and are shaped to define a free space (16) with
vertically deflected extension.

18. Device as in claim 1, characterised in that said
15 rabbling means (7) is so driven to rotate in opposite
direction with respect to said blister band (2).

FIG.1



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FIG. 2

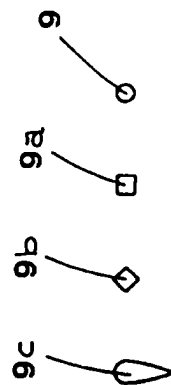
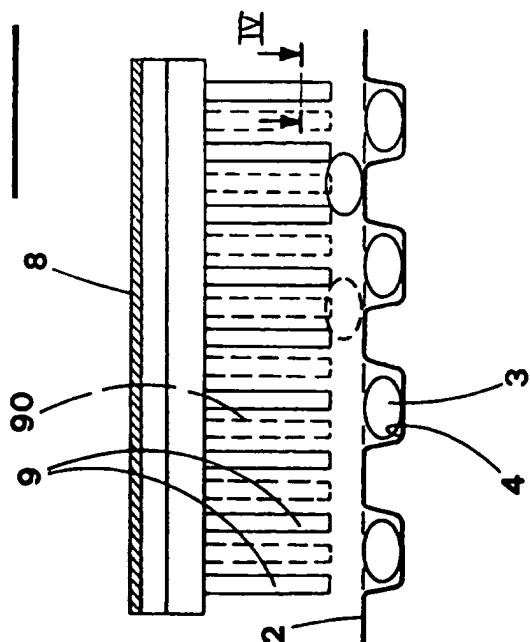


FIG. 4

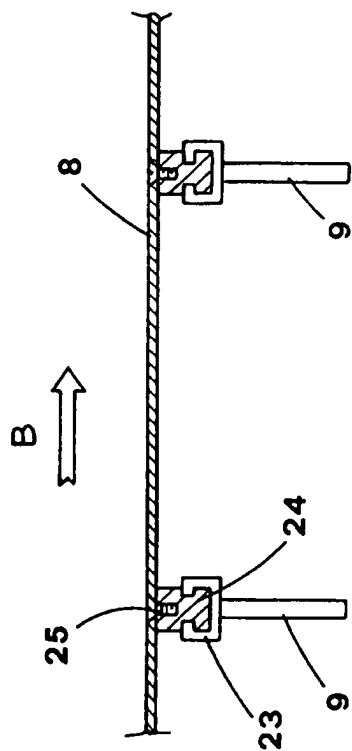


FIG. 3

FIG. 5

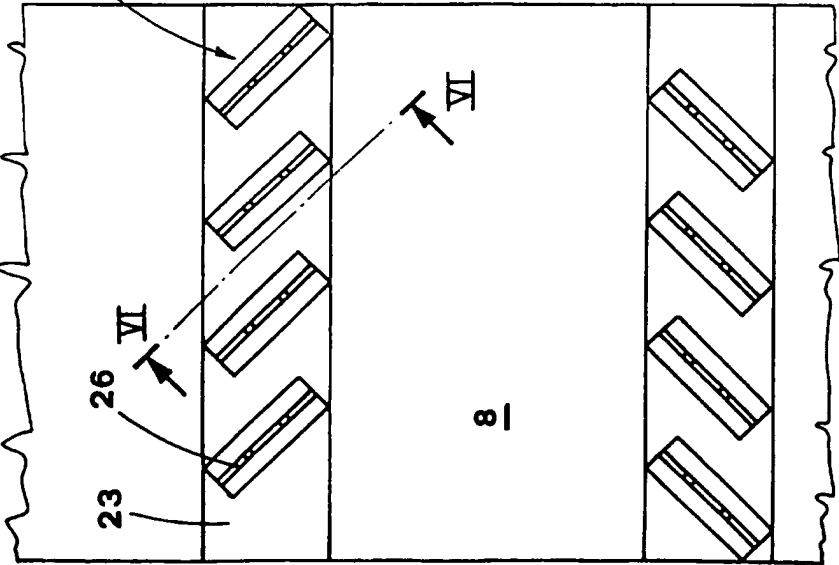


FIG. 6

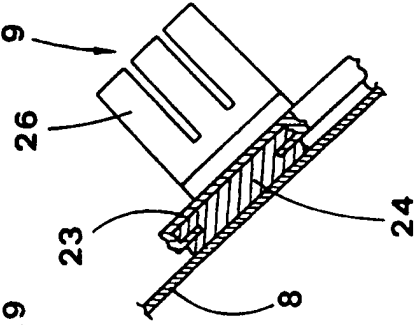
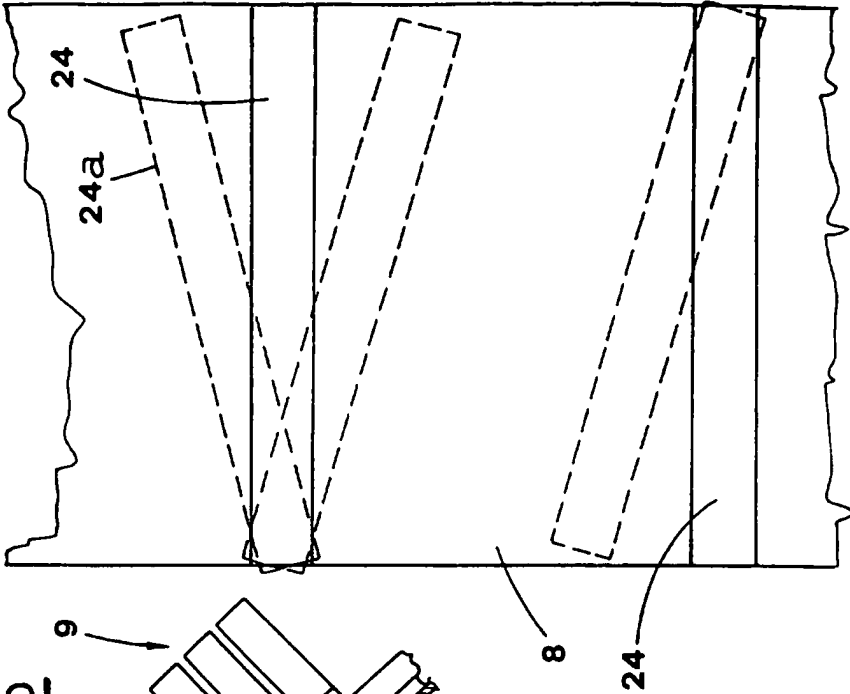


FIG. 7



INTERNATIONAL SEARCH REPORT

International application No.

PC., IB 96/00888

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B65B 5/08, B65B 35/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 3724165 (NICHOLS), 3 April 1973 (03.04.73)	1-18
A	DE, A1, 3325674 (KLINGE PHARMA GMBH), 24 January 1985 (24.01.85)	1-18
A	US, A, 1950909 (THE BROWN BAG FILLING MACHINE COMPANY), 13 March 1934 (13.03.34)	1-18

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the international search

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NL-2280 HV Rijswijk
Tel. (+ 31-70) 340-2040, Tx. 31 651 epo nl.
Fax: (+ 31-70) 340-3016

Authorized officer

KRISTINA PEDERSON

INTERNATIONAL SEARCH REPORT

Information on patent family members

28/10/96

International application No.

PCT/IB 96/00888

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 3724165	03/04/73	NONE	
DE-A1- 3325674	24/01/85	NONE	
US-A- 1950909	13/03/34	NONE	